# The Effect of Area Level Deprivation on Obesity in New Zealand: Analysis of The New Zealand Health Surveys

Andrew A. Halim, Arindam Basu, Ray Kirk
School of Health Sciences, University of Canterbury

## Background:

- Obesity is a growing problem worldwide. New Zealand is the **third fattest** country among the Organisation for Economic Co-operation and Development (OECD) countries, just behind The United States and Mexico.
- **66.8%** of adult kiwis were either overweight or obese in 2015/16.

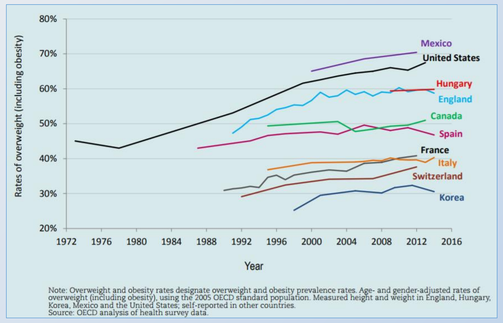


**Figure 1**. Rising overweight/obesity rates in adults aged 15-74 years

- Most discourse on obesity revolves around **diet and physical activity**, but the evidence does not support this idea.

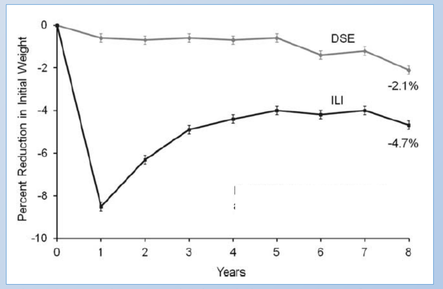


**Figure 2**. Figure shows mean (±SE) weight losses over 8 years for participants randomly assigned to an intensive lifestyle intervention (ILI) or diabetes support and education (DSE; usual care group).

Source: Look AHEAD Research Group. (2014). Eight-year weight losses with an intensive lifestyle intervention: the look AHEAD study. *Obesity (Silver Spring, Md.)*, *22*(1), 5.

- According to the New Zealand Health Survey (NZHS) in 2015/16, people who lived in the most deprived areas were **twice more likely to be obese** than those who lived in the least deprived areas.

## Research Questions:

- Is New Zealand really the **third fattest** country among OECD countries?
- Does **diet and physical activity level** influence a person's Body Mass Index (BMI) status?
- Do people who live in **more deprived areas** still have an excess risk of being obese after adjusting for socio-demographic variables and health-related behaviours?

## Population and Methods:

Data: New Zealand Health Survey data from 2002/03 to 2014/15

Methods: Graphical analysis and proportional odds logistic regression with complex survey design

## Results:

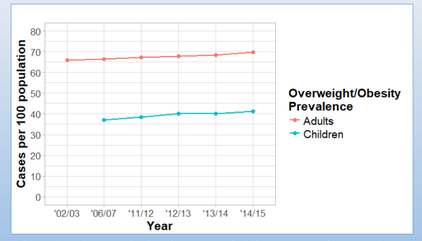


**Figure 3**. Age-standardised overweight/obesity prevalence in New Zealand

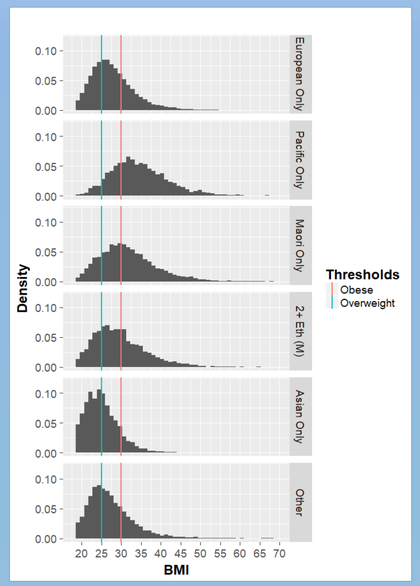


**Figure 4**. BMI histogram across ethnic groups. "2+ Eth (M)" are those who belonged to two or more ethnicities with Māori ancestry.

- The prevalence of overweight/obesity in New Zealand is alarmingly high, but is it?
- Using universal cut-offs for overweight and obesity would mean that more than **90% of Pacific** and more than **80% of Māori** adults are considered **overweight/obese**.
- Adherence to **fruit** (OR= 0.97, 95%CI: 0.93-1.01) and **vegetable** guidelines (OR= 1.21, 95%CI: 1.75-2.05) were **not significant** after adjusting for area level deprivation.
- The odds of being in the higher BMI groups increased as the level of area deprivation increased.

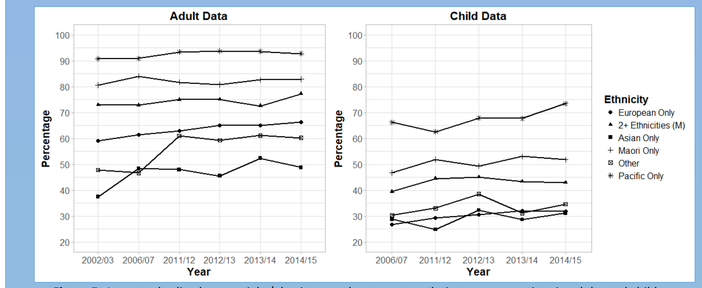


**Figure 5**. Age-standardised overweight/obesity prevalence across ethnic groups over time in adults and children

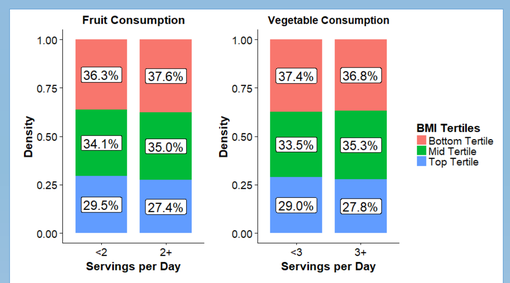


**Figure 6**. BMI tertiles by adherence to fruit and vegetable guidelines in adults

**Table 1**. Regression results in adults

| | Odds Ratio | 2.50% | 97.50% |
|---|---|---|---|
| Deprivation Quintile (ref. group: Quintile 1) | | | |
| Quintile 2 | 1.02 | 0.94 | 1.11 |
| Quintile 3 | 1.10 | 1.01 | 1.20 |
| Quintile 4 | 1.29 | 1.19 | 1.40 |
| Quintile 5 | 1.46 | 1.33 | 1.60 |
| Linear Contrast | 1.19 | 1.11 | 1.28 |
| Ethnicity (ref. group: European only) | | | |
| 2+ ethnicities (M) | 1.72 | 1.57 | 1.88 |
| Asian only | 0.53 | 0.48 | 0.60 |
| Māori only | 3.01 | 2.75 | 3.29 |
| Pacific only | 8.41 | 7.22 | 9.79 |
| Other | 0.91 | 0.84 | 0.98 |
| Age | 1.01 | 1.01 | 1.01 |
| Difficulty Climbing Several Flights of Stairs (ref. group: No difficulty) | | | |
| A little difficult | 1.81 | 1.68 | 1.96 |
| A lot difficult | 1.80 | 1.64 | 1.98 |
| Sex | | | |
| Female* | 0.76 | 0.73 | 0.80 |
| Smoking Status (ref. group: Non smoker) | | | |
| Ex smoker | 1.36 | 1.29 | 1.44 |
| Current smoker | 0.93 | 0.86 | 1.00 |
| Household Income (ref. group: ≤$70,000) | | | |
| $15,001–$40,000 | 1.19 | 1.07 | 1.32 |
| $40,001–$70,000 | 1.41 | 1.26 | 1.57 |
| >$70,000 | 1.59 | 1.42 | 1.77 |
| Educational Qualification (ref. group: No qualifacation) | | | |
| Secondary | 0.89 | 0.83 | 0.96 |
| Tertiary | 0.80 | 0.74 | 0.86 |
| Physical Activity | | | |
| Not physically active | 1.15 | 1.09 | 1.20 |
| Migration Status | | | |
| Native | 1.22 | 1.10 | 1.34 |

* Proportional odds assumption violated

**Table 2**. Regression results in children

| | Odds Ratio | 2.50% | 97.50% |
|---|---|---|---|
| Deprivation Quintile (ref. group: Quintile 1) | | | |
| Quintile 2 | 1.13 | 0.94 | 1.35 |
| Quintile 3 | 1.41 | 1.20 | 1.67 |
| Quintile 4 | 1.50 | 1.28 | 1.76 |
| Quintile 5 | 1.76 | 1.50 | 2.06 |
| Linear Contrast | 1.16 | 1.05 | 1.28 |
| Ethnicity (ref. group: European only) | | | |
| 2+ ethnicities (M) | 1.49 | 1.33 | 1.67 |
| Asian only | 1.04 | 0.84 | 1.28 |
| Māori only | 2.03 | 1.77 | 2.32 |
| Pacific only | 3.93 | 3.31 | 4.68 |
| Other | 1.21 | 1.05 | 1.38 |
| Age | 1.04 | 1.03 | 1.06 |
| Parent's Qualification (ref. group: No qualification) | | | |
| Secondary | 0.73 | 0.64 | 0.83 |
| Tertiary | 0.62 | 0.55 | 0.71 |
| Soft Drink Consumption (ref. group: <1/week) | | | |
| 1/week | 1.15 | 1.03 | 1.29 |
| 2-3/week | 1.24 | 1.10 | 1.39 |
| 4+/week | 1.213 | 1.06 | 1.39 |
| Sex | | | |
| Female | 1.11 | 1.02 | 1.21 |

## Discussion:

- People who lived in deprived areas were more likely to be obese, but this did not appear to be caused solely by their diet or lack of physical activity
- **Deprived communities** face more **social and structural barriers**:
  → poor access to fruit and vegetables
  → less spaces/facilities/opportunities for physical activities
  → high psychosocial stresses
  → lack of access to health care resources
- **Unlike other high-income countries**, adults with higher household income in New Zealand had higher odds of being in the higher BMI groups.
- Universal BMI cut-offs are not useful when comparing obesity across countries with diverse ethnic groups.
- The high prevalence of obesity in The United States maybe caused by a high proportion of African-Americans and Hispanics, which tend to have a higher average BMI.
- **Despite the low average BMI among Asians**, their risk of developing type II diabetes is higher compared with Europeans at the same BMI level.
- Lifestyle interventions targeting diets and physical activity levels failed to achieve long-term weight loss. However, improving a person's diet and physical activity level will **benefit health regardless of weight change**.
- There is an indication that lack of physical activity is not a major driver of obesity. Alternatively, people who are obese would have more functional limitations and cannot exercise as often. Whereas, non-obese people, which tend to have less functional limitations, would be able to exercise more.
- It appears that using BMI or other anthropometric measurements as population health indicators are not useful.

## Recommendations:

- **Stigma** against poor obese people because they eat unhealthy food or are 'lazy' should end.
- Using BMI or other anthropometric measurements as the only health goal should stop.
- Instead, dietary habits and physical activity levels pre- and post-intervention can be used as an indicator to a healthier life regardless of weight change.

## Future Research:

- **Longitudinal research** assessing the effect of area level deprivation on obesity-associated **chronic conditions** while controlling for mobility.
- **Epidemiology research** on obesity-associated **chronic conditions** in **Pacific and Māori**. This will help determine whether specific overweight/obesity cut-offs or a better population health indicator is needed for these groups.